UC SANTA BARBARA
OASIS *Protofab*

Nordson EFD Fluid Dispenser **SOP#: OAS-PF-0510-00**

User Responsibility, Training, and Consequences of Misuse

OASIS prototyping facility, Protofab, operates as a shared research and prototyping facility. All users are expected to follow this SOP, facility policies, and applicable safety guidelines to ensure safe operation, equipment longevity, and equitable access for all users.

This SOP is not a substitute for hands-on training or tool qualification. Refer to User's Manual and Guides for details.
Users must complete required Protofab training and receive authorization prior to independent tool use. In the event of misuse, unintentional error, or non-compliance, corrective actions will be educational, proportional, and focused on preventing recurrence, taking into account the user's experience level and the nature of the issue.

Corrective actions may include:

- Clarification or coaching on proper tool use
- Additional training or temporary supervision
- Temporary suspension of independent tool access
- Restriction to supervised use until competency is re-established

Users may be held responsible for repair, cleaning, or downtime costs only in cases of negligence or repeated misuse.

1. Purpose

This Standard Operating Procedure (SOP) defines the safe and proper use of Nordson EFD manual fluid dispensers. This benchtop tool dispenses controlled or preset amount of material to manually guided locations or patterns.

2. Scope

This SOP applies to standard methods of material dispensing. Non-standard methods and material are outside the scope of this SOP and require prior approval from Protofab staff.

2. Safety & EHS

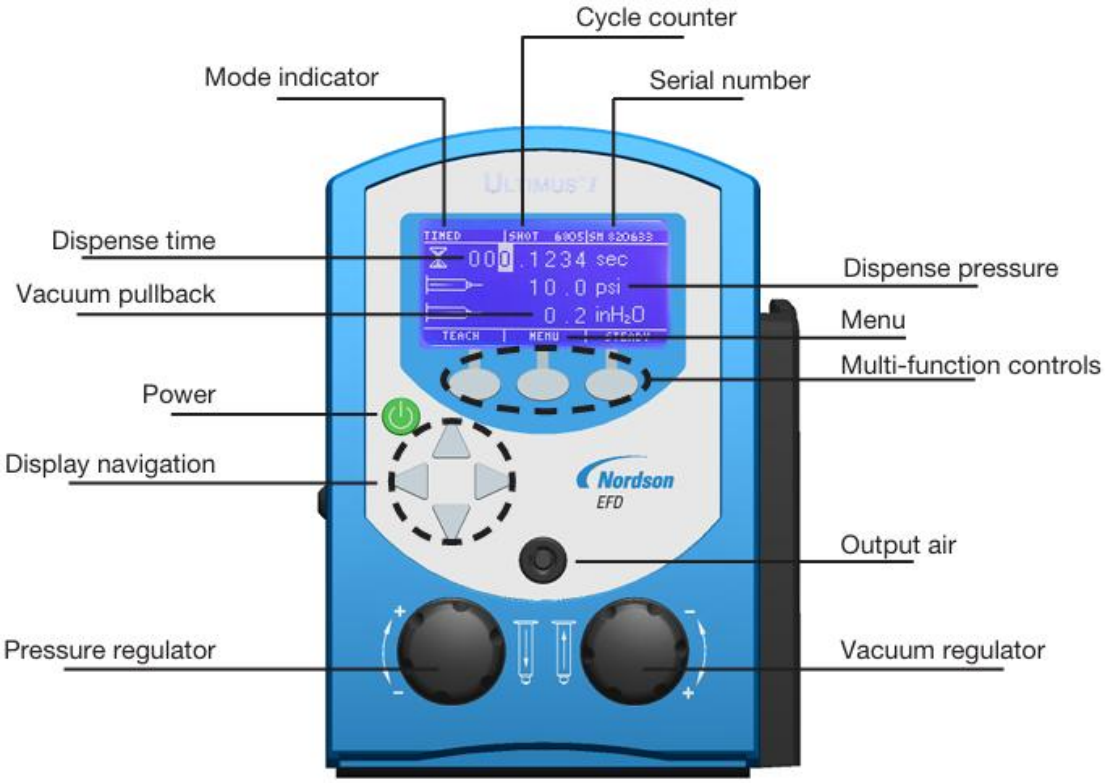
- PPE such as protective eyewear is mandatory except while using microscope eyepieces. Refer to facility rules for details.

- High pressure fluids, unless they are safely contained, are hazardous. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury.
- Fluid penetrating the skin can also cause toxic poisoning.

3. System Overview

Key features include:

- Air pressure, dispense time and vacuum control.
- Input air pressure: 5.5–7.0 bar (80–100 psi)
- Output air pressure: (0-100 psi)
- Dispense Modes: Timed, Steady, Teach and Memory.
- All-digital, multi-function display with simultaneous readout of air pressure, vacuum, dispensing time, and deposit shot count.
- Generic features and control of the dispenser:



4. Application

- Die attach epoxy
- Glob top and encapsulation.
- Underfilling
- RTV for potting and anchoring
- TIM (thermal interface material)
- Optical path epoxy.

5. Pre-use checks (before every run)

- Verify utilities (CDA/vacuum) in range
- Visual inspection / cleanliness such as material sucked into the tube (via vacuum) or contaminated adapter ring.
- Loose adapters and fittings.

6. Standard operating procedure

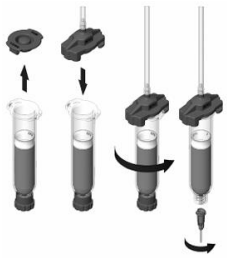
6.1 Startup

a) Open the air/vacuum facility supply line valves to the dispenser

b) Push in the EFD adapter assembly provided into the front of the Ultimus and twist to lock. Make sure the syringe side matches the barrel. (3cc, 5cc, etc.).

c) Secure an EFD syringe barrel filled with your fluid to the adapter assembly.

d) Replace tip cap with an EFD precision dispense tip that is closest to the material properties and application.



e) Turn on the system by pressing the Power button.

Dispense Tip Selection Table:

Precision Dispense Tips

PRECISION STAINLESS STEEL TIPS

Gauge	Color	ID mm	ID inch	OD mm	OD inch	6.35 mm (0.25")	12.7 mm (0.50")	25.4 mm (1.0")	38.1 mm (1.5")	45° / 12.7 mm (0.5")	90° / 12.7 mm (0.5")	45° / 38.1 mm (1.5")
14	Olive	1.54	0.060	1.83	0.072	7018029	7018043	7018032	7018035	7018044	7018045	7016906
15	Amber	1.36	0.053	1.65	0.065	–	7018068	7018059	7018062	7018069	–	–
18	Green	0.84	0.033	1.27	0.050	7018107	7018122	7018110	7018113	7018123	7018124	7016908
20	Pink	0.61	0.024	0.91	0.036	7018163	7018178	7018166	7018169	7018179	7018180	–
21	Purple	0.51	0.020	0.82	0.032	7005005	7018233	7018222	7018225	7018234	–	7016910
22	Blue	0.41	0.016	0.72	0.028	7018260	7018272	7018263	7018266	7018273	7018274	–
23	Orange	0.33	0.013	0.65	0.025	7018302	7018314	7018305	7018308	7018315	7018316	–
25	Red	0.25	0.010	0.52	0.020	7018333	7018345	7018336	7018339	7018346	7018347	–
27	Clear	0.20	0.008	0.42	0.016	7018395	7005008	–	–	7018404	7018405	–
30	Lavender	0.15	0.006	0.31	0.012	7018424	7018433	–	–	7018434	7018435	–
32	Yellow	0.10	0.004	0.24	0.009	7018462	–	–	–	–	–	–

Burr-free, polished, passivated stainless steel dispense tips with polypropylene SafetyLok™ hubs for a secure fit to barrel reservoirs.

SMOOTHFLOW TAPERED TIPS

Gauge	Color	ID mm	ID inch	Standard	Opaque Rigid
14	Olive	1.60	0.063	7018052	7018049
16	Grey	1.19	0.047	7018100	7018097
18	Green	0.84	0.033	7018158	7018147
18	Black	0.84	0.033	7018150	–
20	Pink	0.58	0.023	7005009	7005006
20	Black	0.58	0.023	7018211	–
22	Blue	0.41	0.016	7018298	7005007
25	Red	0.25	0.010	7018391	7018370
25	Black	0.25	0.010	7018373	–
27	Clear	0.20	0.008	7018417	–

Use with gel cyanoacrylates, UV-cure adhesives, sealants, and particle-filled materials or any medium- to high-viscosity fluid. Standard tips are molded of polyethylene. Rigid, opaque tapered tips are molded of polypropylene and the opacity delivers light-blocking functionality.

6.2 Features & Control

- **Power:** Pressing the power button will turn on the unit. A Nordson EFD logo will briefly appear before the Home screen displays. The dispenser will go into sleep mode when it is inactive for more than 90 minutes. Simply press any button or the foot pedal to reactivate the screen.
- **Dispense Mode:** When powered on for the first time, the Home screen displays in TIMED mode. Otherwise, it displays in the mode last used. Dispense Time is, shown with an hourglass icon, displays from 000.0001 to 999.9999 seconds. Follow these steps to set the dispense time:

1. Begin in TIMED mode.
2. Press the left / right arrows to highlight the first number you want to change.
3. Press the up / down arrows to set the dispense time.
4. Repeat as needed to adjust the other numbers in the dispense time row.
    - You can verify the mode by checking the top left corner of the display screen. It will be TIMED, TEACH, STEADY, or MEMORY.
    - You can return to TIMED mode from TEACH or STEADY by pressing TIMED in the bottom right corner of the display.

- You can return to TIMED mode from MEMORY by pressing MENU, then selecting TIMED.

- **Dispense Time:** Dispense time, shown with an hourglass icon, displays from 000.0001 to 999.9999 seconds. Follow these steps to set the dispense time:

1. Begin in TIMED mode.
2. Press the left / right arrows to highlight the first number you want to change.
3. Press the up / down arrows to set the dispense time.
4. Repeat as needed to adjust the other numbers in the dispense time row.

- **Air Pressure:** Is displayed in psi (the unit can be changed). It is shown with the icon of an arrow pushing into a syringe barrel. Follow these steps to set air pressure:

1. Pull the air pressure regulator knob out to unlock it.
2. Turn the knob clockwise to increase the pressure or counterclockwise to decrease the pressure.
3. Push the knob in to lock the pressure setting.

- **Vacuum:** Vacuum is displayed in inH2O (the unit can be changed). It is shown with the icon of an arrow pulling out of a syringe barrel. Follow these steps to set vacuum pressure:

1. Pull the vacuum regulator knob out to unlock it (bottom right knob).
2. Turn the knob clockwise to the desired setting. You can adjust the vacuum in increments of 0.1 inH2O.
3. Push the knob in to lock the vacuum setting.

6.3 Setting Parameters

Apply steps below for new material and recipe.

- **STEADY Mode:**

1. Pull the air pressure regulator knob out until it clicks into the unlocked position. Start with pressure set to 0.0 bar (0 psi).
2. Press and hold the foot pedal or finger switch.
3. Slowly, turn the pressure knob clockwise until your fluid begins to dispense out of the tip in a controlled flow (not too fast, not too slow).
4. Push the air pressure knob in to lock the setting.

- **TIMED Mode:**

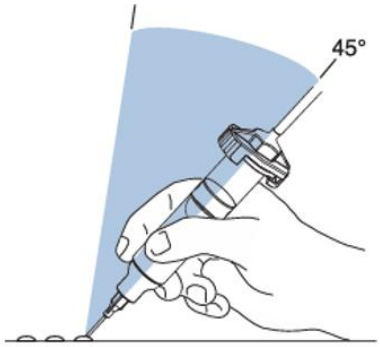
1. Set the time to 000.0250 seconds.
2. Rest the dispense tip on a test surface.
3. Press the foot pedal (or finger switch) to activate the dispense cycle.

Note: The pedal only needs to be pressed for a moment. The complete time will run once you activate the dispense cycle.

4. **Changing the time changes the deposit size.** If your dot is too small, increase the time to increase the deposit size. If your dot is too large, decrease the time to decrease the deposit size.

6.4 Normal Operation

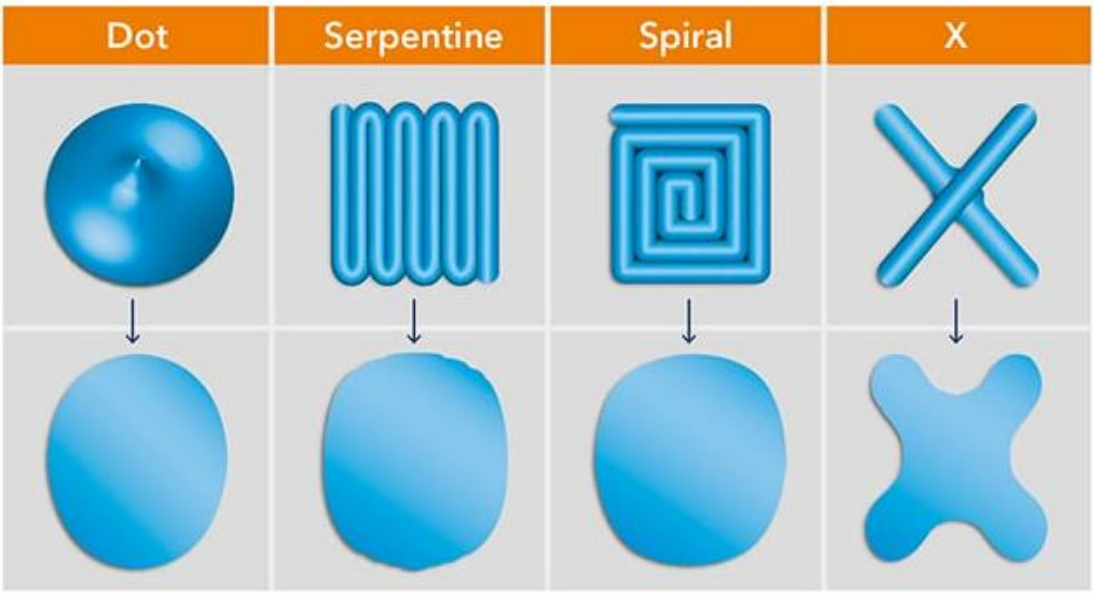
1. Bring the tip in contact with the work surface at the illustrated angle.
2. After the tip is in position, press the foot pedal (or hand switch).
3. Release the pedal/finger switch and remove the tip by lifting straight up. **Note the correct angle for consistent deposit.**



Dispense Pattern: There is no set standard for where a particular pattern should be used since each application is unique. Below are typical dispense patterns before and after compression.

Helpful Hints:

- Smaller tips require more pressure and more time. Try different tips without changing the time or pressure settings and observe the results.
- Tapered tips reduce the amount of air pressure needed to dispense thick materials. They also help prevent drooling at the end of a dispense cycle.
- Avoid high pressure (example: 5.5 bar / 80 psi) with very short time settings (less than 000.0100 seconds). The ideal setup matches air pressure and tip size to produce a "workable" flow rate — no splashing but with a time setting that is not extremely low.
- Longer dispense time settings generally provide the highest accuracy.



6.5 Shutdown

a) Check or wait until dispense cycle is completed and syringe is not under pressure.
b) Disconnect the syringe from the adapter.
c) Press and Hold the Power Button to turn off the system.
d) Shut down the facility supply lines of air/vacuum if applicable.

7. Process recipes / parameters

- Recipes (settings) and dispense tip combination can be found on ProtoWiki.
- Note that the recipes are baseline and may vary from material to material and their volume (in the barrel).
- Adjust the setting according to your application.

8. Change log

- Date / author / summary